CONFIRMATION OF *EUPLOEA LEUCOSTICTOS* (GMELIN) AND *E. NETSCHERI ERANA* (FRUHSTORFER) (LEPIDOPTERA: NYMPHALIDAE) IN TORRES STRAIT, QUEENSLAND, AND THE FIRST RECORD OF *E. TULLIOLUS DUDGEONIS* (GROSE-SMITH) IN AUSTRALIA

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Abstract

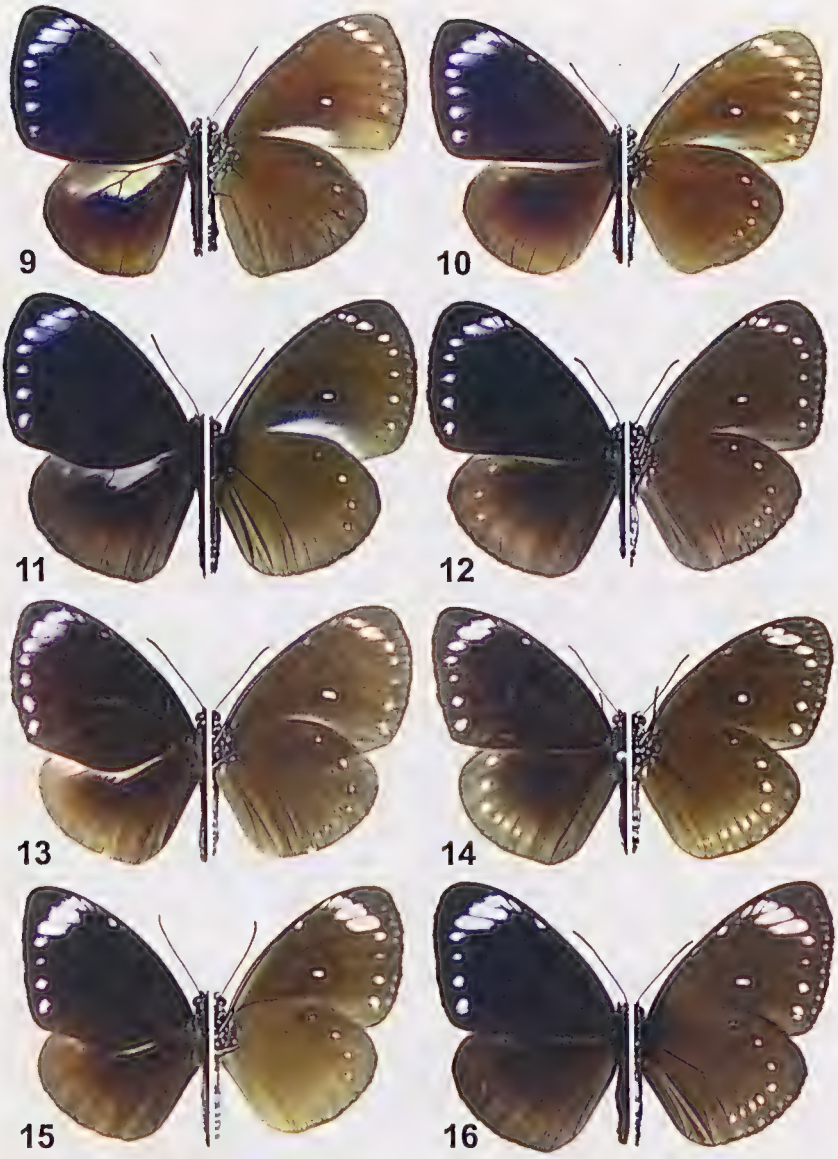
Recent collections of *Euploea leucostictos* (Gmelin) and *E. netscheri erana* (Fruhstorfer) on Saibai and Dauan Islands confirm their establishment in Torres Strait, Queensland. *Euploea tulliolus dudgeonis* (Grose-Smith) is recorded in Australia for the first time from Dauan Island, and its relationship with *E. t. tulliolus* (Fabricius) is discussed. Up to date information on collections of the four taxa in Torres Strait is provided, including their variability and diagnostic facies, current distributions, seasonality, habits and prevalence. Evidence is provided suggesting that a sympatric zone exists for *E. t. tulliolus* and *E. t. dudgeonis* on Dauan and Yam Islands, with some intermediate specimens known from these and other Torres Strait islands. Confirmed Australian specimens of *E. leucostictos* and *E. tulliolus dudgeonis*, together with the male underside and female of *E. netscheri erana*, are illustrated for the first time.

Introduction

The greatest diversity of *Euploea* Fabricius occurs within the Indo-Australian region, with at least 54 species known (Corbet and Pendlebury 1978, Ackery and Vane-Wright 1984, Parsons 1998), especially on Java, Sumatra and in northern New Guinea (Scheermeyer 1999). Most *Euploea* species are medium-sized (forewing length *ca* 40 mm) and velvety-black or dark brown with some white markings, although the forewings of some species are adorned with blue hues overlying the white markings (D'Abrera 1978, Morishita 1985, Parsons 1998). Other species, such as *E. leucostictos* (Gmelin) (form *usipetes* Hewitson) and *E. wallacei* C. & R. Felder, are predominately orange and black (Parsons 1998), while some forms of *E. stephensii* C. & R. Felder are pearly white in colour (Morishita 1985). The majority of *Euploea* species are restricted to forest or heavy woodland habitats (Ackery and Vane-Wright 1984), but some occur in open woodland and urban areas, including coastal woods and mangroves (Braby 2000, Lambkin 2001).

On mainland Australia, diversity among *Euploea* is relatively poor, with only *E. core corinna* (W.S. Macleay) and, to a lesser extent, *E. tulliolus tulliolus* (Fabricius) being widely distributed. The three or four other mainland species [the placement of *E. eichhorni* Staudinger as a subspecies of *E. alcathoe* (Godart) is still conjectural (Lambkin 2001)] are restricted to tropical Australia (Scheermeyer 1999, Braby 2000). The diversity of *Euploea* increases just north of mainland Queensland, with 10 species known from Torres Strait (Braby 2000, Meyer *et al.* 2004). Of these 10, eight have been

Figs 1-8. *Euploea* spp. All figures to scale: upperside left, underside right [forewing lengths in parenthesis]. (1-6) *E. leucostictos*: (1, 3, 5) males: (1) Dauan I., 21.iv.2001 [40 mm]; (3) Dauan I., 29.xii.2005 [40 mm]; (5) Dauan I., 20.i.2004 [42 mm]; (2, 4, 6) females: (2) Dauan I., 19.ii.2004 [42 mm]; (4) Dauan I., 25.xii.2005 [41 mm]; (6) Dauan I., 17.xii.2005 [43 mm]. (7-8) *E. netscheri erana*: (7) male, Dauan I., 17.ii.2004 [40 mm]; (8) female, Dauan I., 5.i.2006 [42 mm].



Figs 9-16. *Euploea tulliolus*. All to scale: upperside left, underside right [forewing lengths in parenthesis]. (9-12) *E. t. dudgeonis*: (9) male, Subitana, PNG, 10.vii.1949 [35 mm]; (10) female, Subitana, PNG, xii.1949 [34 mm]; (11) male, Dauan I., 18.i.2004 [36 mm]; (12) female, Dauan I., 17.xii.2005 [35 mm]; (13-14) *E. t. dudgeonis/tulliolus* intermediates: (13) male, Yam I., 11-12.vi.1992 [34 mm]; (14) female, Thursday I., 12-15.iv.1992 [34 mm]; (15-16) *E. t. tulliolus*: (15) male, Murray I., 29.iii.-4.iv.1986 [34 mm]; (16) female, Murray I., 29.iii.-4.iv.1986 [36 mm].

recorded from Dauan Island (unpublished data), a small, volcanic island with large stands of vine thicket located just off the south-west tip of Saibai Island, close to the Papua New Guinea border. In general, the distribution and seasonality of *Euploea* species in Torres Strait are poorly documented; only Braby (2000) briefly summarised what was then known. In addition, the overall similarity between many *Euploea* species and a high degree of polymorphism has made their delimitation notoriously difficult (Ackery and Vane-Wright 1984). Furthermore, females of *Euploea* are often even more difficult to identify because of the similarity of many species, a problem compounded by the prevalence of mimicry complexes, the lack of secondary sexual characters, variable wing patterns (Ackery and Vane-Wright 1984, Parsons 1998), and what appear to be natural hybrids (De Baar 1991).

Of the 10 species recorded from Torres Strait, the majority are now well represented in many private collections. Despite this, three species are still known from very few specimens: a single male of *E. modesta* Butler was recently collected on Murray Island (Meyer *et al.* 2004); *E. leucostictos* (Gmelin) is currently known by only a handful of specimens (Waterhouse and Lyell 1914, Braby 2000); while *E. netscheri erana* (Fruhstorfer) is recorded from a single male collected on Dauan Island in May 1995 (Johnson and Valentine 1997). In addition, because of the paucity of collection records, it has been uncertain if these three species breed within Australian territory, or if the few specimens known to date are vagrants from Papua New Guinea.

In this paper, up to date information on collections of *E. leucostictos* and *E. netscheri erana* from Torres Strait is provided, including notes on their variability and diagnostic facies, their current distributions, seasonality, habits and prevalence. These recent records point towards both species being resident in Australia. In addition, *E. tulliolus dudgeonis* (Grose-Smith) is recognised in Australia for the first time, its relationship with *E. t. tulliolus* (Fabricius) is discussed and current data on their distribution, habits and seasonality in Torres Strait are reported.

Abbreviations of collections and their locations are: ANIC – Australian National Insect Collection, Canberra; CGMC – C.G. Miller collection, Lennox Head; JFDC – J.F. Donaldson collection, Thornlands; MDBC – M. De Baar collection, Brisbane; QM – Queensland Museum, Brisbane; QMTQ – Queensland Museum of Tropical Queensland, Townsville; PSVC – P.S. Valentine collection, Townsville; QDPIFC – Queensland Department of Primary Industries Collection, Brisbane; SSBC – S.S. Brown collection, Bowral; TLIKC – joint collection of T.A. Lambkin and A.I. Knight, Brisbane. Abbreviations of collectors are: AIK – A.I. Knight; CGM – C.G. Miller; EH – E. Hamacek; EJLH - E.J.L. Hallstrom; IFTA – Insect Farming and Trading Agency; JA – J. Andrews; JFD – J.F. Donaldson; MDB – M. De Baar; NG – N. Gough; PSV – P.S. Valentine; SJJ – S.J. Johnson; SSB – S.S. Brown; TAL – T.A. Lambkin; WWB – W.W. Brandt.

E. leucostictos (Gmelin)

(Figs 1-6)

Material examined. QUEENSLAND: 1 ♂, Cape York [ex Miskin Collection] (QM); 1 ♀, Thursday Island, Torres Strait [ex Illidge Collection] (illustrated in Tindale 1923); 1 ♀, Saibai Island, Torres Strait, 25.xii.1980, JA (PSVC); 7 ♂♂, 5 ♀♀, Dauan Island, Torres Strait, 21.iv.2001 (♂), 18.i.2004 (♀), 20.i.2004 (♂), 24.i.2004 (♀), 25.i.2004 (♂), 16.xii.2005 (♂), 17.xii.2005 (♀), 23.xii.2005 (♂, 2 ♀♀), 25.xii.2005 (♂), 29.xii.2005 (♂), AIK (TLIKC); 1 ♂, same data except 22.iv.2001, AIK (ANIC); 1 ♂, same data except 24-30.i.2004, AIK (SSBC); 1 ♀, same data except 3.iv.2004, PSV (PSVC); 1 ♂, 1 ♀, same data except 5.iii.2005 (♂), 6.iii.2005 (♀), SJJ (QMTQ); 1 ♀, same data except 13-19.iv.2001, SSB (SSBC); 1 ♂, 1 ♀, same data except 19.ii.2004 (♀), 6.i.2006 (♂), TAL (TLIKC); 2 ♂♂, Murray Island, Torres Strait, 9.iii.1995, TAL (TLIKC). PAPUA NEW GUINEA: 3 ♂♂, 1 ♀, Kiunga, Fly River, 2.vii.-31.x.1957, WWB (ANIC); 1 ♂, Rouku, Morehead River, 1962 (MDBC).

Discussion. Euploea leucostictos is a wide-ranging species, occurring from the Taluad Archipelago and Buru through the Moluccas, New Guinea, the Bismarck Archipelago and the Solomon Islands, to Vanuatu (New Hebrides), New Caledonia and Fiji (Ackery and Vane-Wright 1984, Parsons 1998). It is widespread throughout Papua New Guinea, extending south to Western Province and into Torres Strait. Parsons (1998) reported that it is 'occasional generally' and is most often associated with marginal secondary forest up to 1200 m. Prior to Parsons (1991), the taxonomic placement of many of the forms of *E. leucostictos* in New Guinea was unclear, as the species is locally and regionally highly variable and is thought to form part of two or three Müllerian mimicry complexes, including an association with an orange *Euploea* species, *E. wallacei*, throughout mainland Papua New Guinea (Parsons 1998). For convenience, Parsons (1998) provisionally named these different phenotypes as forms of *E. leucostictos*, although the only form occurring in the part of Western Province bordering Torres Strait is the orange form 'usipetes' (Parsons 1998, ANIC Brandt collection, as illustrated in Braby 2000).

The first specimens of *E. leucostictos* known from northern Australia, and being the only specimens known for the better part of a century, were a male from Cape York and a female from Thursday Island in Torres Strait (Waterhouse and Lyell 1914). The male, in the Queensland Museum (QM) and described as *E. hippias* Miskin by Miskin (1890), formed part of Miskin's collection, which included a number of other *Euploea* types described at the same time (Miskin 1890). Subsequently, Waterhouse and Lyell (1914), illustrated Miskin's type, recognised *E. hippias* as a junior synonym of *E. usipetes* Hewitson and nominated *E. u. hippias* as the Australian subspecies. A review of Miskin's *Euploea* types in the QM has indicated that most specimens have almost no label data, apart from collection locations, except the type of *E. amycus* Miskin, which has reference to a date, 'F.M. -/5/75'. This date might also refer to the collection

time of Miskin's Cape York specimen of *E. leucostictos*. During the latter part of the 19th century, numerous natural history collections were made at Cape York (Lambkin 2005, Olliff 1891), but some doubt exists concerning the veracity of some of these collection records, as Cape York and Thursday Island were common ports of call en route to and from Aru and New Guinea (Whittell 1954, Monteith 1987, Lambkin 2005). Considering that Miskin's specimen of *E. leucostictos* (*E. hippias*) is still the only specimen known from the Australian mainland, there is still some doubt as to the true origin of Miskin's type. Equally, very little is known of the female specimen from Thursday Island except that it was originally in the collection of R. Illidge, before passing to the T.P. Lucas collection, and eventually was acquired by the South Australian Museum (illustrated in Tindale 1923). Additionally, as no further specimens are known from Thursday Island, the veracity of the female specimen's stated locality might also be questionable.

These two *E. leucostictos* specimens remained the only known Australian examples until 1980, when a female was collected on Saibai Island in December, by J. Andrews from James Cook University, Townsville (PSVC). With a general increase in collecting in Torres Strait during the 1990s (Lambkin and Knight 2005), two further males were collected on Murray Island (TLIKC), and an additional 20 specimens have been accumulated from Dauan Island since 2001. Apart from the single female collected on Saibai, which is predominately a mangrove island, the remaining specimens have all been collected on Murray and Dauan Islands, which are largely covered with monsoon vine thicket. Despite all known specimens being of form 'usipetes', some variation occurs in both sexes in the extent of the forewing orange area and the size of the white patch enclosed in this area (Figs 1-6). Variation also occurs in the presence and number of the forewing upper and underside subapical white spots, and in the size of the single white spot occurring in the subterminal area of the forewing upperside (Figs 1-6). These characters are also variable in specimens from southern Papua New Guinea (ANIC).

The males from Murray Island, and the majority of specimens known from Dauan Island, were collected roosting or congregating with other *Euploea* spp. (Braby 2000) in the afternoon, under or near large flowering trees of *Terminalia* spp. and mangroves. In addition, a number of specimens have been netted from *Melaleuca* blossom in the early morning. In Torres Strait, label data from the known specimens of *E. leucostictos* indicate that it has two generations annually, with the majority of specimens collected at the start of the wet season in December and January (14 specimens) and then again in March and April (8 specimens), with only a single male known from February. Almost all known specimens collected from Torres Strait are in good condition, indicating that they were unlikely to be vagrants but were probably established. Therefore, collection data indicates that in Torres Strait, the species is restricted to Dauan, with the probability of a remote population

occurring on or near Murray, as Murray represents a close group of three islands: Mer (Murray), Dauar and Waiar.

Euploea netscheri erana (Fruhstorfer)

(Figs 7-8)

Material examined. QUEENSLAND: 1 ♂, Dauan Island, Torres Strait, 2-5.v.1995, SJJ (QMTQ); 1 ♂, 2 ♀♀, same data except 17.ii.2004 (♂), 5.i.2006 (♀), 6.i.2006 (♀), TAL (TLIKC); 1 ♀, Saibai Island, Torres Strait, 13.ii.2004, AIK (TLIKC).

Discussion. Euploea netscheri Snellen is a localised lowland species (Ackery and Vane-Wright 1984, Parsons 1998) that occurs on Gebe, Seram, Misool, Salawati, Waigeo, Japen and eastwards throughout mainland New Guinea (Ackery and Vane-Wright 1984, Parsons 1998). In Papua New Guinea, only *E. n. erana* occurs. It is a distinctive subspecies, typically distinguished by its broad, pale wing margins which contrast strikingly with the very dark brown ground colour of the wings. The male has a prominent sex-brand distinctively placed in the subterminal area of the forewing upperside below vein CuA_2 (Fig. 7). In Australia, the species was previously known only from a male collected on Dauan Island, Torres Strait in May 1995 (Johnson and Valentine 1997). Since 2004, three more specimens have been collected on Dauan (1 male, 2 females) and another female has been collected on nearby Saibai. The external facies of all known specimens are consistent with the male illustrated by Johnson and Valentine (1997) and the male and female illustrated here (Figs 7-8).

The male and female specimens collected in 2004 were flying in sparse vine thicket bordering mangroves, while the two females netted more recently (in 2006) were roosting under a flowering *Terminalia* sp. All females flew in a relatively lazy manner and were easily netted, while the male flew briskly about a metre above the ground. It is remarkable that, despite intensive collecting of *Euploea* spp. on Dauan and Saibai since 2001, only four specimens of this species have been collected.

E. tulliolus dudgeonis (Grose-Smith)

(Figs 9-12)

Material examined. QUEENSLAND: 12 ♂♂, 9 ♀♀, Dauan Island, Torres Strait, 25.iv.2000 (♀), 8.v.2000 (♂), 18.v.2000 (♂), 3.iv.2001 (♂), 4.iv.2001 (♀), 20.iv.2001 (♂), 16.i.2004 (♂), 18.i.2004 (4 ♂♂, 2 ♀♀), 17.xii.2005 (♂, 2 ♀♀), 19.xii.2005 (♀), 23.xii.2005 (♂), 25.xii.2005 (2 ♀♀), 29.xii.2005 (♂), AIK (TLIKC); 1 ♂, same data except 11.v.2001 (ANIC); 3 ♂♂, 1 ♀, same data except 18.ii.2004 (3 ♂♂), 10.i.2006 (♀), TAL (TLIKC); 1 ♂, Saibai Island, Torres Strait, 15.v.2001, AIK (TLIKC); 1 ♂, 1 ♀, Yam Island, Torres Strait, 11-12.vi.1992, AIK (JFDC). PAPUA NEW GUINEA: 1 ♂, Subitana (Central District), 1800 ft, 10.vii.1949, WWB & EJLH (ANIC); 1 ♂, same data except 12.x.1949; 1 ♀, same data except xii.1949; 7 ♂♂, Sambio, Mumeng, Morobe Province, xii.1984 (2 ♂♂), i.1985 (5 ♂♂), IFTA (TLIKC); 2 ♂♂, Bulolo, Morobe Province, i.1985, IFTA (TLIKC).

E. tulliolus dudgeonis/tulliolus intermediates

(Figs 13-14)

Material examined. QUEENSLAND: 5 ♂♂, 6 ♀♀, Dauan Island, Torres Strait, 31.iii.2001 (♂), 16.i.2004 (♀), 18.i.2004 (♂, ♀), 24.i.2004 (♂, ♀), 17.xii.2005 (2 ♂♂), 25.xii.2005 (2 ♀♀), 4.ii.2006 (♀), AIK (TLIKC); 1 ♂, Yam Island, Torres Strait, 20.vii.1977, CGM (CGMC); 1 ♂, same data except 11-12.vi.1992, AIK (TLIKC); 2 ♀♀, same data except 11-12.vi.1992, AIK (JFDC); 1 ♀, Green Hill, Thursday Island, Torres Strait, 12-15.iv.1992, TAL (TLIKC); 1 ♂, Campbell Island, Torres Strait, 3.iv.1987, MDB (MDBC).

E. tulliolus tulliolus (Fabricius)

(Figs 15-16)

Material examined. QUEENSLAND: 2 ♂♂, 2 ♀♀, Dauan Island, Torres Strait, 20.iv.2001 (♀), 21.iv.2001 (♂), 25.xii.2005 (♂), 7.ii.2006 (♀), AIK (TLIKC); 1 ♂, Murray Island, Torres Strait, 2.v.1984, NG (QDPIFC); 2 ♀♀, same data except 29.v.-3.vi.1985, JFD & EH (QDPIFC); 3 ♂♂, 3 ♀♀, same data except 29.iii.-4.iv.1986, MDB (MDBC); 4 ♀♀, same data except TAL (JFDC); 4 ♂♂, 3 ♀♀, same data except TAL (TLIKC); 1 ♂, 1 ♀, same data except TAL (QDPIFC); 6 ♂♂, 1 ♀, same data except 30.iii.1990, JFD (JFDC); 2 ♂♂, 1 ♀, same data except 13.i.1994, TAL (TLIKC); 1 ♂, 3 ♀♀, same data except 14.i.1994 (♂), 15.i.1994 (2 ♀♀), 14.v.1994 (♀) TAL (JFDC); 1 ♂, same data except 7.iv.2001, SSB (TLIKC); 5 ♂♂, Darnley Island, Torres Strait, 1-2.iv.1987, MDB (MDBC); 1 ♂, Thursday Island, Torres Strait, 27-30.iii.1987, MDB (MDBC); 1 ♂, 1 ♀, Campbell Island, Torres Strait, 3.iv.1987, MDB (MDBC); 1 ♂, Yam Island, Torres Strait, 24.iii.1994, TAL (JFDC); 1 ♂, Jara Ck., W. of Tully, 13.v.1979, TAL (QDPIFC); 2 ♂♂, Flying Fish Pt., 14.v.1979, TAL (QDPIFC); 1 ♀, Mackay, 18.v.1971, JFD (JFDC); 2 ♂♂, 1 ♀, Yeppoon, 1.v.1985 (♂), 10.v.1987 (♂), 24-30.vi.1990 (♀), AIK (TLIKC); 1 ♂, 1 ♀, 3 km E of Palmwoods, 22.ii.1978, JFD (JFDC); 1 ♂, Maleny, 24.ii.1974, TAL (QDPIFC); 2 ♂♂, 1 ♀, same data except 9.iii.1975; 1 ♀, same data except 25.i.1976; 4 ♂♂, 1 ♀, Mt. Beerburrum, 29.i.1977, TAL (QDPIFC); 1 ♂, Currumbin, 2.iii.1980, TAL (TLIKC). NEW SOUTH WALES: 1 ♂, Victoria Pk., 7.ii.1974, TAL (QDPIFC).

Discussion. Euploea tulliolus is widespread from Taiwan and southern China, through the Malay Peninsula, the Philippines, Sumatra, Borneo, Java, Sumba, Sumbawa, Flores and New Guinea, eastwards to Vanuatu and Fiji and south to northeastern Australia (Ackery and Vane-Wright 1984, Parsons 1998). It is absent from Timor, Sulawesi and the eastern Lesser Sunda Islands (M. De Baar, unpublished data). Closer to Australia, *E. t. dudgeonis* occurs throughout mainland Papua New Guinea (Parsons 1998), while the nominate race, *E. t. tulliolus*, is restricted to Australia, occurring in Torres Strait, throughout Cape York Peninsula and coastal Queensland, to northern New South Wales (Braby 2000). *Euploea t. dudgeonis* differs from *E. t. tulliolus* in possessing much smaller forewing subapical and subterminal white markings on both upper and undersides, a more intense blue sheen on the forewing upperside, and vibrant blue patches overlying these upperside white markings (Figs 9-10) (Parsons 1998, ANIC). The difference between the sizes of the forewing white markings of both taxa is particularly diagnostic when viewed

from the underside; the white markings of *E. t. dudgeonis* appear as spots or dots, while in *E. t. tulliolus* they are prominent bars, particularly in the spaces above veins M_1 and M_2 (Figs 9-16). Within Papua New Guinea, *E. t. dudgeonis* is a variable taxon, with specimens from Morobe Province (Bulolo and Sambio) having the white forewing markings reduced markedly to white dots, while a male illustrated by Parsons (1998), and specimens examined (ANIC) from Subitana in Central Province, very closely resemble individuals from Dauan and Yam Islands (Figs 9-12). Despite the variability of *E. t. dudgeonis*, it always has the blue sheen on the upperside of the forewing but never has the distinctive long, subapical white bars that *E. t. tulliolus* consistently has (44 males and 26 females examined; Braby 2000).

In Torres Strait, collection records indicate that the species has a patchy distribution (Lambkin and Knight 2005), likely related to the distribution of the larval host plant, *Trophis scandens* (Lour.) Hook. & Arn. (Moraceae). Lambkin and Knight (2005) discussed the distribution of *E. tulliolus* in Torres Strait and concluded that it was confined to islands with stands of beach or monsoon forest, and was known from the following islands: in the east of the strait (Murray, Darnley, Campbell and Dalrymple [just west of Campbell]), in the centre (Moa, Sue and Yam), in the south from Thursday Island, and from Dauan Island in the north (Fig. 17). Until now, all Torres Strait material was believed to be *E. t. tulliolus*. However, an examination of material from Campbell, Darnley, Dauan, Murray, Saibai, Thursday and Yam Islands has shown that many specimens from Dauan (26 of 45) (Figs 11-12), two of seven known from Yam, and a male from Saibai were identical to *E. t. dudgeonis* from Papua New Guinea, particularly those from Central Province (ANIC) (Parsons 1998) (Figs 9-10). Almost all specimens examined from other Torres Strait islands were typical *E. t. tulliolus* (Figs 15-16), with a number of intermediate forms recorded, predominately from Dauan and Yam (Fig. 13), but also from Campbell and Thursday Islands (Fig. 14).

Ackery and Vane-Wright (1984) alluded to the taxonomic problems that occur with the various 'races' of *E. tulliolus*. They based this view primarily on ecological data observed in several countries throughout its range, and concluded that the taxon probably represents a group of sibling species. In support of this premise, *E. t. dudgeonis* from Dauan and Yam Islands has a distinct seasonality that is somewhat different from that of *E. t. tulliolus* recorded from other Torres Strait islands (Braby 2000). On other islands in Torres Strait where the species occurs, it is generally widespread and common, and is observed throughout the year (unpublished records, Waterhouse and Lyell 1914, De Baar 1988, Lambkin and Knight 1990). Conversely, on Dauan Island, where one of us (AIK) has collected intensively over the period from December to May (with other unpublished records from November), and on Yam (unpublished collection records from March, April, June and July), collection records indicate that *E. t. dudgeonis* is generally rare but may be occasional locally with flight mostly restricted to

two main periods (Fig. 18). Most specimens recorded are from a first 'brood' that occurs at the onset of the wet season in December and January, while a second 'brood' principally occurs in April and May. On Dauan, both sexes of *E. t. dudgeonis* fly in vine thicket margins, where they visit blossom of *Melaleuca*, *Terminalia* and mangrove species, and roost or congregate with other *Euploea* spp under *Terminalia* spp, mangroves and in bamboo thickets.

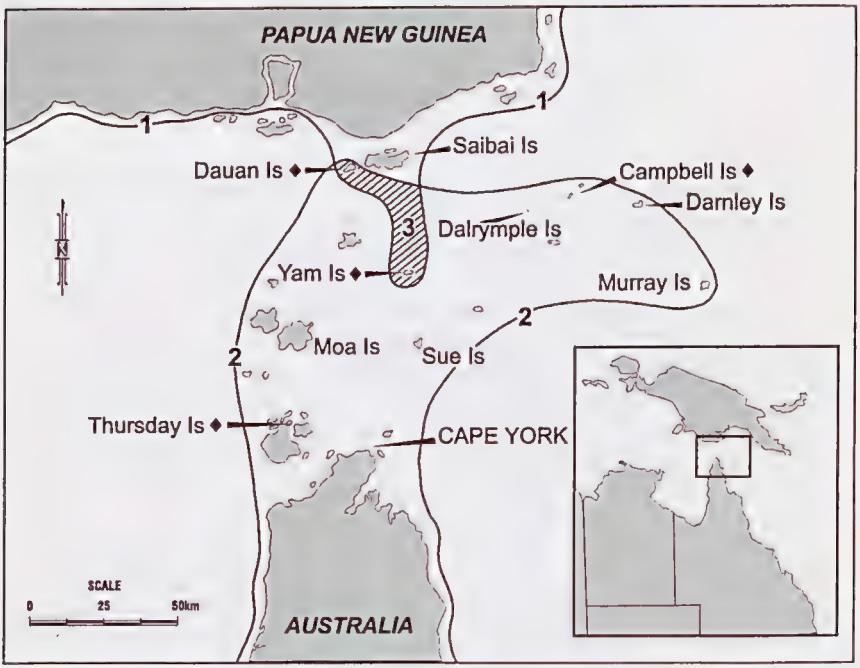


Fig. 17. Torres Strait, Queensland: recorded distribution of *Euploea tulliolus dudgeonis* (1), *E. t. tulliolus* (2) and sympatric zone (3), with locations of some known intermediate specimens indicated with ♦.

The two taxa, currently classified as subspecies, might well be separate species forming a hybrid zone in Torres Strait, as is the suspicion for other *Euploea* spp. (De Baar 1991). This is further evidence in support of Ackery and Vane-Wright's (1984) sibling species supposition. Nonetheless, this current study indicates that *E. t. dudgeonis* occurs exclusively in Papua New Guinea and, in Australia, on Dauan and Yam Islands in Torres Strait. Moreover, typical *E. t. tulliolus* occurs solely in eastern Australia and Torres Strait, where it is recorded infrequently in the north of the strait. Thus, a sympatric zone occurs on Dauan and Yam, with intermediates found predominately on these two islands and, occasionally, on other islands such as Campbell and Thursday (Fig. 17).

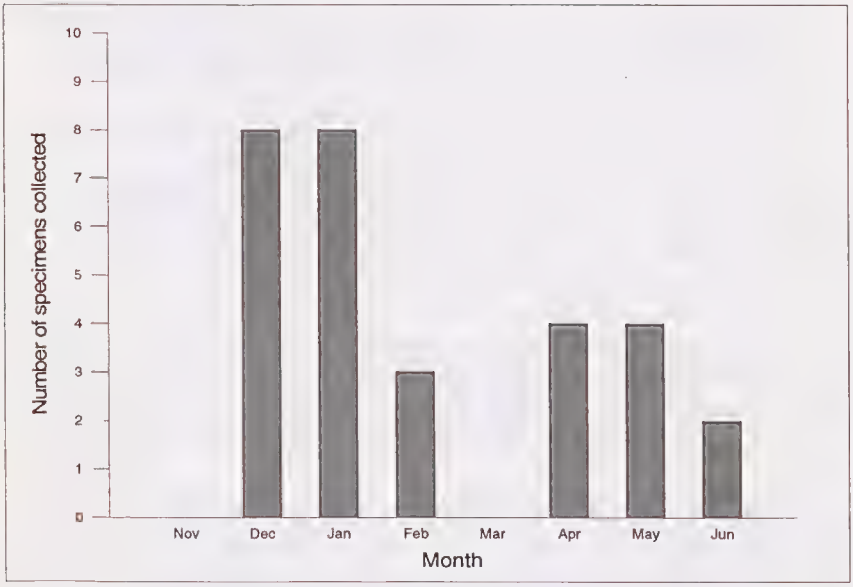


Fig. 18. Seasonality of *Euploea tulliolus dudgeonis* in Torres Strait, Queensland (Dauan, Saibai and Yam Islands): data based on November to June collection records (n = 29).

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